COMPUTERS ARE NOW CHESS MASTERS

New Scientist

David Levy is an international chess master and ex-computer programmer

Ever since 1770, when the Royal Court at Vienna marvelled at Von Kempelen's chess automation, man has been fascinated by the possibility of producing a chess machine. Baron von Kempelen was an excellent illusionist capable of convincing his audience that the automatan could not possibly contain a human being when, of caurse, the reverse was true. His invention was exhibited far and wide and pravided the inspiration far variaus other similar machines which were built during the next 100 years. It was nat, however, until the end of the 19th century that a Spanish inventor, Torres y Quevedo, constructed the first device which really did play chess, or rather a subset of chess, without the need for human intervention. Torres's machine played the endgame af king and rook versus king, always farcing mate with the extra rook, though nat in the shortest number of moves.

The advent af electranic camputers raised the questian af whether ar nat it is possible ta write a pragram that wauld play goad chess. The father af this particular science was the US mathematician Claude Shannon who, in 1949, published a paper in which he outlined a scheme whereby computers could be programmed ta play chess. His fundamental principles were simple enaugh, yet three decades later they still form the basis af almast all chess programs.

The first program to play real chess was written during 1957 by Alex Bernstein af MIT

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ATTENTION FOURTH YEAR : THIS YEAR's GRAD BALL will be held on SAT. MARCH 10

TICKETS ON SALE SOON
STAY TUNED FOR FURTHER DETAILS.

the CANNON

FEBRUARY 1 1979

University of Toronto Engineering Society

U.C. has challenged the Engineers to see who can give the most blood... Let's show the bastards who's good for the most pints...

Medical Sciences Bldg. Monday Feb 5 to the 9th 10 to 4 daily except thursday till 6

Is solar power more dangerous than nuclear?

New Scientist

Dr Herbert Inhaber is a scientific adviser ta the Atamic Energy Contral Baard af Canada

Consider a massive nuclear power plant, closely guarded and surraunded by barbed wire. Compare this with an innocuous salar panel perched on a roof, cheerfully and silently gathering sunlight. Is there any question in your mind which af the two energy systems is more dangerous to human health and safety? If the answer were a resounding "No", the matter could end there, and the editors would be left with a rather unsightly blank space in their journal. But research has shown that the answer shauld be a less dramatic but perhaps more accurote "maybe".

Haw can this be? Consider anather example. In the driveway we have two vehicles. One is a massive larry, and the other a tiny Mini. Which of the two is more eficient? No, not larger—more efficient. Their relative size is easy to judge, but efficiency involves the amaunt of petrol used, the distance travelled, as well as the weight carried.

The moral? Yau can't judge the relative risk of an energy system merely by its size or fearsome appearance. You must find the risk per unit energy—that is, its total risk ta human health divided by the net energy it produces. This is the only fair way of camparing energy systems.

In addition, we must consider the total energy cycle, not ane isolated campanent. If you calculate the risk of anly part of o system and campare it with the corresponding part of another, by judiciausly choasing the camponent yau cauld prove that any energy system is riskier (or safer) than any other system. You wauld abviously be praving precisely nathing.

You may wonder why the Atomic Energy Contral Baard (AECB), the main regulatary agency for nuclear power in Conada, is cancerned with this question. We do our best to minimize nuclear risk, but we are not in the business af regulating other energy farms. The answer is simple: the AECB has been studying the risk of nuclear pawer, but the results will have mare meaning if they are put into context. That is, finding that nuclear pawer praduces a certain number of man-days last per megawatt-year has only a limited meaning to nan-

Solar energy and other unconventional energy sources may seem harmless enough but if we look at the complete production chain we find that they are less benign than they first appear

specialists. Knowing that this value is twice (or half) that af other energy systems means a lot more.

We can calculate the net energy output easily enough. But what is the tatal risk? The new field of risk accounting addresses this question.

By now, most people working on energy questions have heard af energy accaunting. This extension of the accauntant's art adds up all the energy required for campanents of a system in arder to determine the averall energy requirement. Far example, a coal-burning electricity plant needs X kilawatthaurs of energy to mine each tonne af coal, Y to lay each kilometre of track to transport it, Z to construct each turbine, and so an. By summing the required energy inputs, we can compare the result to the output.

Risk accounting is based an the same principles. All saurces of risk are evaluated in terms of the deaths, injuries or diseases they cause. This implies that we evaluate not only the final stage of energy praductian, but the initial and intermediate stages. For example, in the two cases mentianed in the first paragraph, we would evaluate the risk in mining the sand, copper, iron, caal, uranium and ather raw materials that are required, as well as the risk due ta fabricating them into glass, capper tubing, fuel rods, steel and all ather necessary campanents. To this wauld be added the risk associated with transporting material, manufacturing components, and the mare abvious risk of canstructing and aperating the nuclear-powered station ar solar panel.

Risk accaunting has been around a long time, in various guises. For exomple, nuclear power, caal, oil and natural gas were compared in terms of risk per unit energy by C.L. Comar and L.A. Sagan in a landmark article in the 1976 Annual Review of Energy. They found that, when all the major sources of risk far each technalogy were summed, nuclear power had a substantiolly lower risk than coal- or oil-burning stations. Other studies both before and after have confirmed this.

But those wha are uneasy

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solar power

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about nuclear pawer, ar wha even denaunce it, rarely advacate a return to coal and the smaky cities we all faced a few decades aga. Rather, they usually propose the use of "alternative", "soft" or "conventional" technalagies such as solar, wind, acean thermal, methanol, geathermal and a panoply of athers. The question then is, what is the risk af each of these technologies compared with canventional systems like caal, oil and nuclear?

Results of our risk accounting are surprising, to say the least. They indicate that when all the saurces of risk are accounted for, most nanconventional technalagies fare rather badly in comparison with conventianal ones. Figure 1 shows our results. The vertical axis refers to the tatal man-days lost by bath workers and members of the public due to death, injuries ar disease per unit net energy output far each system. Ta combine fatalities with less serious disabilities, an arbitrary number af man-days last (6000) was assigned to each death.

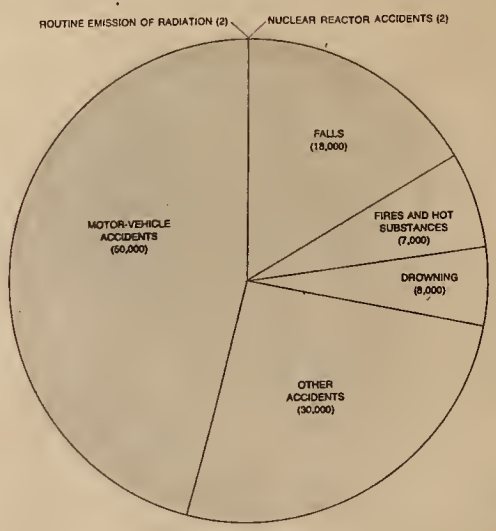
Electricity produced fram natural gas has the lowest risk of the 10 technologies (four conventional, six nonconventional). it is a factor af abaut twa lawer than the next highest, nuclear power. Third is a nan-canventianal system ocean thermal, which can convert the temperature differences af ocean layers inta electricity. Mast ather nanconventional systems have far higher risk. However, the highest af all are caal and ail, with risk abaut 400 times that of natural gas.

Materials add risks

What are the reasons for these surprising rankings? The details are contained in a recent (AECB) repart*. The main reasan why nonconventional systems have relatively high risk is the large amount af materials and labour they require per unit energy output. Why should salar need more materials than coal or ail? it's because of the diffuse nature of the incaming energy: salar and wind energy are weak, and require large callectian and starage systems ta amass an appreciable quantity af energy. Caal, ail and nuclear systems deal with cancentrated forms af energy and sa require less apparatus. This argument is simplistic and glasses aver many lesser considerations, but is generally faund to be true. Figure 2 shaws the results af these calculatians.

The large quantity af materials required for unconventional systems implies huge industrial effarts in mining, refining, fabricating, and canstructing the collectars, starage systems and all related apparatus. Every form af industrial activity has an associated risk, which can be faund through accident statistics compiled by national arganizatians. When all the multiplicatians and additions are done, we find that the risk fram unconventional energy systems can be substantial.

This raises an interesting paint. Althaugh these systems are labelled uncanventional, their risk cames, in the main, farm highly canventianal saurces. in other wards, the risk from windmills doesn't come primarily fram a blade flying off and hitting yau on the head, and the risk fram salar space heating daesn't arise from falling off the raof as yau make that last little adjustment. Rather, it cames fram the more mundane tasks of mining the caal, iron and other raw materials and fabricating them into steel, copper and glass.



ACCIDENT RISKS

The overall risk, as shawn in Figure 1, may be divided inta twa categaries: occupational and public risk. Occupatianal risk is incurred by thase connected ta the process af producing and aperating an energy system: public risk is incurred by everyane else. Because of the different mixes of materials and labour in each energy system, the rankings within each of the two risk categaries are not necessarily the same as for the averall risk. Results far each of the two categaries are given in the Table.

In terms of occupational risk, natural gas used to produce electricity ranks lawest, fallawed clasely by nuclear. This acupational risk includes, far example, that incurred in drilling, building pipelines, constructing distributian netwarks, and so an. Caal risk is much higher. While the risk per haur spent in the mine is nat strongly dissimilar far coal and uranium miners, the latter worker praduces for more energy per unit time worked. As a result, his occupational risk per unit energy is much lawer.

The remarkably high accupatianal risk for methanol is primarily due to one factor—lagging. in Canada (and elsewhere in the world), this is a jab with quite high accident rates. Plans for methanol plants have implied that large volumes of waad would be gathered, so the risk would be commensurately large.

However, in terms of public risk methanal ranks second lowest, behind natural gas used ta make electricity. As far as is knawn, the cambustion of methanol produces little or no air pallutian, sa the risk to the public is close to zera. On the other hand, mast of the large public risk from caal and oil combustion is derived from air pallutian.

How can uncanventional technologies like wind ar solar thermal (the "tower of pawer" cancept) have substantial public risk? The answer is simple. The productian af the metals needed in many unconventional technalagies requires that caal is burned, and this coal will produce air pallutian, which in turn causes public health effects. in addition, public risk is produced by the necessary back-up was used. This pracedure, not fallawed far any other energy system, was chasen as a way af remaving suspician af pronuclear bias which often clouds energy debate.

Accaunting far hazards

There isn't room here for a full discussian of the methadalagy—the full AECB system, required for when the Sun daesn't shine and the wind daesn't blaw.

It may well be cantended that the first of these twa saurces takes the analysis too far back, that the caal, iron are too far removed fram the are too remaved frkom the final production of energy ta play a part in risk accaunting. However, the role af basic materials in the analysis is important. If energy is needed, the nuclear plants or solar panels must be built. Ta produce the plants or panels, we need to mine, refine, fabricate, and install the raw and intermediate materials, the campanents and finished products. We cannot avoid risk by ignoring it just because it happens to somebody else.

The energy system with by far the greatest amount of cantroversy abaut its risk is undoubtedly nuclear power. In a study of this type, we cauld not review all the claims and counter-claims about nuclear risk which have been made, especially with respect ta reports such as the 4000-odd pages of the Rasmussen study on nuclear reactor safety (WASH-1400). instead, a survey was taken of the major papers in the scientific literature which had estimated aspects of nuclear risk, including a monograph written by a well-knawn nuclear critic, John Haldren of the University of California at Berkeley. Far each component of risk, the highest value form the group af scientific sources report contains further details of its features—however, because material acquisition and construction produce large risk for same energy systems, a brief review may be useful. Suppase mining X tonnes of coal or any other material ta produce a unit output of net energy requires Y man-years. if the number af man-days lost per year of work is Z, then the number af man-days lost per unit of energy output is YZ/X. A similar calculation is made for the number of man-hours per unit energy output and the risk associated with various required occupational categories such as engineering, canstruction, operation and maintenance, and so on. We find the risk assaciated with each part of the system in the same way, and add them to determine the total. The calculations require no advanced mathematics or abstruse models; merely the ability to multiply and add.

This type of calculation implies that certain data are available: the time required per unit of production; rates of industrial accidents, disease and death; construction times; and, raw material requirements for industrial processes. While none of these data is known absolutely, they are known adequately for purposes of a general study such as this. Because the same methodology was applied to all the systems, wherever possible, potential inadvertent bias was reduced to a law level. Different methodology was applied to all the systems, wherever passible, patential inadvertent bias was reduced to a low level. Different methodologies were used for such risk sources as transpartation, air pallution used for such risk saurces as transportation, air pollution and waste disposal. Every effart was made to ensure that all energy systems considered were treated as unifarmly as possible.

Contrary ta the intuition of many people, the risk to human health (and its resulting consequences) per unit energy from unconventional energy sources such as solar and wind are apparently higher than thase of conventional saurces such as electricity produced fram natural gas and nuclear power. There are at least two reasons why intuition fails: first, we tend to ignare all parts of the energy cycle except the last, most visible aspect; and secondly, we forget that risk must be compared in terms of unit energy output.

The above canclusions have implicatians beyond that af energy. Many peaple have advacated the use of decentralised energy systems as part af a palitical and ecanamic pracess. Due to the risk they entail, material requirements alone may preclude this aptian. Neither i nar the Atamic Cenergy Control Board propose the use ar non-use af any particular energy system. However, all of us must have knowledge af the risks involved in order to make reasaned judgments an the technical aceptability af a particular system. ■

The praductian of salar cells and related peripherals contribute to the higher than expected risk. Here we see a ribban af silican crystal being grown from a pool af malten silican at Mabil Tyca.

computers

cont. from pg. 1

for the IBM 704. this program warked by selecting the seven best maves, examining the seven best replies to each af these moves, then the best seven replies to the replies, and finally the best seven replies to each of these replies. This produced a tree of variations which culminated in 7⁴ ar 2401 positians. These "terminal" positlons were evaluated using a numerical function af various chess features such as material and mability, and a path through the tree was found which represented best play for bath sides. The program then played the first move on this path. It taok eight minutes per move and played at the level of a weak club player.

Computer chess did not really attract public attention until 1967, when a match was arranged between an US program and one in the Soviet Union. The score was 3-1 in the Russians' favour (twa wins and twa draws). Had the two drawn games been played ta a finish, however, I think it likely that the result would have been 4-0. Clearly, Soviet domination of world chess at that time extended ta computers.

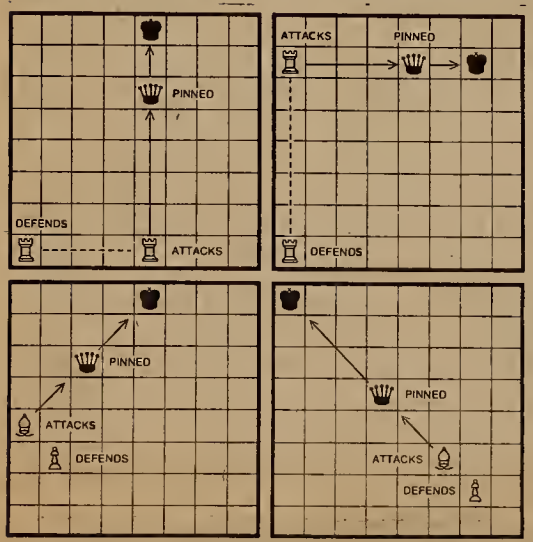
At abaut the same time as this match, a strang new pragram appeared an the scene. Written at MIT by Richard Greenblatt, it was named MacHack VI. Not anly was it strang enough ta achieve reasonable scares in human tournaments, it alsa startled the chess warld by finding a sacrificial cantinuatian that had been averlooked by a number of US masters. (A sacrificial continuation invalves giving up a piece in arder to launch a strong attack. it must be carefully calculated, because if it daes nat lead ta a sufficient advantage, it instead brings sure defeat.) This pragram received so much publicity that many individuals and graups were encouraged ta begin working an camputer chess, with the result that by 1970 there was sufficient interest in North America far a tournament to be held in which all the campetitors were computer programs. There are naw twa computer chess taurnaments each year, including a triennial world champianship event which was won in 1974 by KAISSA, develaped at the Institute for Central Science, Moscaw, and in 1977 by CHESS 4.6, developed in the US at Narthwestern University.

My awn interest in computer chess gaes back ta the late 1960s. In August 1968 I attended a machine intelligence workshop at the University of Edinburgh. During a cacktail party held one evening I happened to play a game of chess with John McCarthy, one of the world's leading experts in the field af artificial intelligence (AI). At that time I was the reigning Scottish chess champion.

I won the game against McCarthy, who then remarked that although he was not able ta beat me, there would be, within 10 years, a computer pragram which could. Being extremely sceptical and naving something af a betting nature, I offered to wager 500 paunds with McCarthy that he was wrang. Donald Michie, the arganizer of the annual warkshop, jained in our conversation with the result that he and McCarthy agreed to bet 250 paunds each. The terms af the bet were that I would win unless a camputer pragram won a match against me before the end of August 1978.

The following year I presented a paper on computer chess at the Edinburgh warkshop. During the questian and answer sessian following my paper I was heckled by Seymour Papert, an AI prafessar at MIT, who saan added 250 pounds to the bet.

In 1971 I was invited ta act as the tournament director and commentator at the second annual computer chess tournament organised by the US Association for Computing Machinery. One of the programmers at the tournament in Chicago was Ed Kozdrawicki, a professor at the University of California at Davis. By then my bet had only seven years to run, yet Kazdrowicki felt so confident that I was wrang that he affered to bet me $1000. I was still an impecuniaus programmer at the time and $1000 sounded like a lot of money, so I taak 250 paunds of the actian (then worth $650) and the remaining $350 was taken up by Professar Ben Mittman, who heads the computer centre at Northwestern University where the current world champion program was written.



TEACHING COMPUTER TO GENERALIZE is one of the major goals in writing a computer-chess program. As these four diagrams illustrate, the basic structure of chess is somewhat independent of the actual positions of the pieces. In the two top diagrams a white rook pins the black queen against the black king, which means that the queen must either stay put or else capture the attacker. If the queen elects the latter course, she will herself be captured by the second rook. The two bottom diagrams show variations on the same theme except that here a white bishop does the pinning while being defended by a lowly pawn.

Burning midnight oil

This bet has created considerable interest in the chess world, in computer science and AI. The challenge of meeting the August 1978 deadline has inspired programmers to burn the midnight oil. David Slate, one of the authors af CHESS 4.6, has even gone over to part-time work sa that he can devote six months to his program in the hope that he will improve it sufficiently to give me a serious problem in August. His partner, Larry Atkin, is working on a robot arm which will move the pieces and press the button on the chess clock (shades of Von Kempelen!).

The final match far the bet will be played in Tilburg (Holland) or Toronto during the final days of August. I expect the Northwestern program—by then upgraded to CHESS 4.7 or 5 —to give me a tough time but I think that I will be able to beat it.

Even thaugh I shall probably win my bet I am forced to admit that in 1968 I would never have believed passible the advances that have been made in camputer chess during recent years. In the summer af 1976, CHESS 4.5, the then current version of the Northwestern program, won the Class-B section at the Paul Masson Tournament (for humans) in California. Early the following year it won the Minnesota Open Championship. It has defeated a number of international masters (including myself) and twa grandmasters (the rank above international master) at blitz chess, a farm af the game in which each player has only a few minutes in which to make all his moves. More recently, I alsa last ta CHESS 4.6 in blitz chess. Even running on a slower camputer than usual, CHESS 4.5 scared 5½ points fram seven games in a tournament held in Jahannesburg this May, where i and another internatianal master scored 6. The Narthwestern pragram is naw stronger than 99.5 per cent of all the world's chess players, whereas a few years ago its results were far more modest. What has happened ta bring about this change?

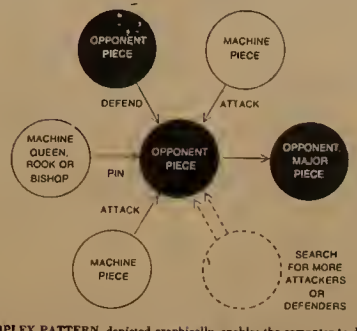
The answer to this questian lies in two areas. First, Slate and Atkin have learned an enarmous amount about computer chess during the past decade and have recently been putting this information to gaad effect by making their program mare saphisticated in a number of ways. For example, the pragram now thinks in its opponent's time so that it can laak at even mare variatians than it did before. Secondly, the Control Data Corparation allaws the program to run on its Cyber 176, the world's fastest cammercially available computer. These are those wha argue that when, in anather decade, camputers are tens ar hundreds of times faster than they are now, chess pragrams will be able ta laak at so many positians that they will play like strong grandmasters, maybe even like warld champions. Perhaps they are right.

Different strengths and weaknesses

Computer programs do not play chess in the same way that human beings do; they "think" differently and they have a different style of play, with different strengths and weaknesses. Because of these differences a human apponent has more chance of defeating the best programs if he changes his style of play specially far the occasian. I da this myself and thus far my policy has been rather effective—in the twa challenge matches that i have played as part of my bet, against CHESS 4.5 in Pittsburgh in April 1977 and against KAISSA in Mantreal in December 1977, I wan withaut permitting either program to play the type of position that it handles best.

Chess can be separated inta strategy and tactics. Strategic play involves planning, manoeuvring, evaluating subtle differences in positian, and thinking about the longterm effects of certain formations Tactical play is concerned with the exact calculation of sacrifices, checks, and captures and threats. I would describe chess as a game af strategy in which tactics are used to cash in on a strategic advantage or to take advantage af a blunder.

The best chess programs are excellent tacticians because calculation is their forte. They are considerably less adept at evaluation and their abilities to plan are almost nanexistent. It therefore seems appropriate for the human to avoid tactics when playing against a camputer program, unless he is absolutely certain that the tactics will be to his advantage. I have often seen strang human players overlook tactical matifs that were seen by a program within seconds.



MORE COMPLEX PATTERN, depicted graphically, enables the computer to discover opportunities to pin an opponent piece against a major piece, such as a rook, a queen or a king. Pattern is flexible not only as to the positions of white and black pieces involved but also with respect to the numbers of pieces attacking and defending the pinned piece.

Thus the strategy I adapt is to do nothing. But I do it very carefully. Saaner or later the program will dig its own grave.

When I played CHESS 4.5 in April 1977 I employed my favaurite variation of the Sicilian Defence. Against this defence I had naticed that this particular program often makes an incorrect knight exchange when it daes not know what else to do, so in the opening phase I deliberately played an inferiar mave to take the program out of its openings baak, whereupon it immediately exchanged knights, presenting me with a strong pawn centre and a useful half-apen file an which I could possibly launch a counterattack.

Later in the game I moved an important defensive piece away from my king sa that it could take part in my queenside attack. I was not worried about denuding my king because I knew that the pragram did nat passess the canceptual ability to plan a correct attack. My strategy was quickly vindicated and I crashed through on the queenside, pramoting my queen's rook pawn to the eighth rank. I only hope that the improved narthwestern pragram will not be any the wiser when I meet it this August.

Are chess programs intelligent?

Are computer chess programs as intelligent as chess masters? They da nat think in the same way as chess masters because chess masters examine only 50 to 100 positions when making each mave compared with the millions of positions examined by CHESS 4.6. What chess masters lack in speed of analysis they make up for in accuracy af evaluation and in knawing which moves and variatians are warth examining and which should be rejected. We must therefore ask whether the artificial manner in which programs play chess enables them to appear intelligent ta a strong human player.

Mathematician Alan Turing devised a test ta determine whether or not a computer pragram could be said to be intelligent. In chess terms the Turing test might be expressed as follows: if a chess master were ta play a game against an opponent wha was invisible to him, and could not tell fram the game whether his opponent was a human or a program, then if the oppanent was a computer program that program could be said to be intelligent.

I have never been faced with this situation but I doubt very much whether I, or any other chess master, could correctly identify an opponent that was a strang camputer program. Although there are stylistic differences, these differences become less and less noticeable as the best programs become stronger. I think that CHESS 4.6, KAISSA, Duke University's DUCHESS and possibly one or two ather pragrams have already passed the stage where correct identificatian ceases to be passible. The best chess programs must naw be considered "intelligent" in the Turing sense, thaugh the brute force way that they play chess is anything but intelligent in human terms.

cont. on pg. 4

Engineering Society

Coming Events

Thursday

February 1 at 5 pm. Chemical Club Smoker
Common Room, W8 238

February 8 Engineering Society Executive Meeting
Hart House North Dining Room

February 15 at 7pm at Captoin John's
ENGINEERING SCIENCE DINNER
COST:12 bucks each
or 23 bucks if you know someone else
who wants to go.
Tickets are available at the ENGSCI
office ML220 before friday feb.9th.

Friday

February 2 Civil and Nurses Folk Pub
New College

Saturday

February 3 Yearbook Make-up in the Eng. Soc. Offices
any time after noon.
All helpers are of course welcome.

Monday

February 5 SKULE NITE tickets go on sale at STORES

February 12 Nominations open for Engineering Society elections
President
Vice President:Activities
Vice President: Administration
Treasurer
Secretary

Wednesday

February 7
1:00 - 2:30 p.m.
Place: Room 3171 Medical Science Building

Speaker	Topic
Prof. P.H. Oosthuizen Department of Mechanical Engineering Queen's University	"Transportation of Coal by Rail with Particular Emphasis on the Freezing Problem"

The next issue of the Connon is going ta have a ciculation of 23,000 , o figure which is abaut seven times the current figure. The reason for this drastic increase is because of a fantastic demand for this high class journal. The issue in question is going to be called the ALUMNI ISSUE as it will be sent to all the living engineering alumni.

a) There is a massive talent search being conducted by the editorial staff of this paper. The purpose of our quest is to find among the readership, a few of youwho aspire to produce literoture for the enlightenment, merriment, and or benefit of your fellow reader. Filling this requirement, simple though it may be, are but a couple of hundred of you. Anyhow, if there is something in your mind that you would like to see in print for all the golden-guys of the alumni, please set it to words and submit it along with any peripherals that you think would clarify the idea. The deadline for this is in about ten days. Just put it in the CANNON mailbox. This could make you fomous.

Remember...all contributions will be judged fairly ond with an open, some say hollow, mind. By the way, we are looking for general interest stories as well. Tell us about straight tone-arms being superior to those crazy S-shaped wonders, about the benefits of fuel-injection against the carbeurated engine, what one polymer said to the other polymer...

LETTERS

Sirs,
Last week's issue of the Cannon reported a planned $2 increase in the fee collected by the Engineering Society for the Engineering Athletic Association (EAA) 'to take effect next year'. Given our constitution, which requires approval of fee changes by council and by a general referendum, and the University Administration's deadlines for receiving fee increse requests, achieving any change by 1979-80 seems practically impossible.
It is however, the principle of the fee change which i want to address. The Engineering Athletic Association, like the Engineering Society is facing the crunch of static revenue and ever increasing operating costs. This calls not for automatic
requests for higher levies on the student, but for creative budgetting and for changing those traditions which have become a financial burden on the organization.
The S-Dance is one example of an expensive tradition. Sooner or later we must face the fact that the EAA con no longer afford to spent approximately $5,000 (40 percent of its revenue) on this event. The first solution is to charge admission to the dance. This was under discussion two years ago along with elliminating the serving of food, but tradition won them out. Can this policy still be justified?
A major portion of the S-Dance budget is spent on trophies and prizes. Perhaps these should be scaled down from pewter steins ($20) and pen sets to more modestly priced mementos. Engineers should, and most do, participate in interfaculty and intramural sports for the competition, exercise and comradie - not the prizes. The potential savings on this event alone, if traditions were changed, could come close to providing the additional $4800 which the EAA forecasts it will need in 1979-80 to replace equipment.
Over the past four years, i have played on nine intrafaculty teams, and thus, have benefitted from the dedication and enthusiasm of those who work behind the scenes with the EAA. They deserve much credit for their continual efforts on our behalf. The value of the opportunities and services which the provide is unquestionable. Only when all the fat and non-athletic related expenses have been trimmed from the EAA budget will the quality of the Engineering athletic program begin to be affected by increasing costs. At that time, i am sure that Engineering students will provide the necessary financial support for the EAA, but the current plonned $2 fee increase request is premature.

Karen Kennedy

Dear Sirs,

i am compelled to respond to Hubert Vogt's 'review' of Engineering Society meeting inyour last issue (Jon.26,79).

The entire second paragraph is incorrect and shows a complete lack of understanding of the issue and of the workings of the University. What i reported to the Executive Committee was that the issue was re-opened and that if we request it, the Community Affairs Committee of our Faculty can authorize the placement of pinball machines in our space. Governing Council has nothing to do with it.
Michelle's last name is Smith.
The draft by-laws need only be approved at o second meeting of Council, and do not require a referendum.
I would greatly appreciate it in the future, if you intend to cover Society meeting, that you go to the trouble of sending someone in-touch with the Society or someone who is prepared to do the small amount of investigation required to avoid such problems.

Rob Yates 7T9
Engineering Society President.

Mr. Vogt volunteered to cover such events. We were happy to have the news from them and consequently decided to publish. If you find error in his reporting, why not write a synopsis of the events at the meetings, and submit them yourself. The Cannon is always looking for such voluntary service.

Editors.

the CANNON 978-5377

Associate Editors: Dana Williams, Rob Pupulin, Pete Rankin

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Wilson Lee Wing

the CANNON is the journal of the Engineering Society. It is run by the students in the faculty of Engineering with the intent of providing the students in Engineering with an interesting and informative newspaper. All those who would like to help with your paper are welcome to. Submissions to the CANNON are also welcomed. They should be typed. The editors reserve the right to edit letters. The office of the CANNON is located on the Third Floor, Old metro Library, 20 St. George ST., Toronto, Ontario. M5S 2E4.

Chess masters

cont. from pg. 3

Note from the editors.....

It is not known how this match ended. Anyone possessing such knowledge is cordially invited to reveal said knowledge to us for the enlightenment of your fellow readers. ■

...AND THERE'S NO DOUBT I'll be a great asset to your company...'